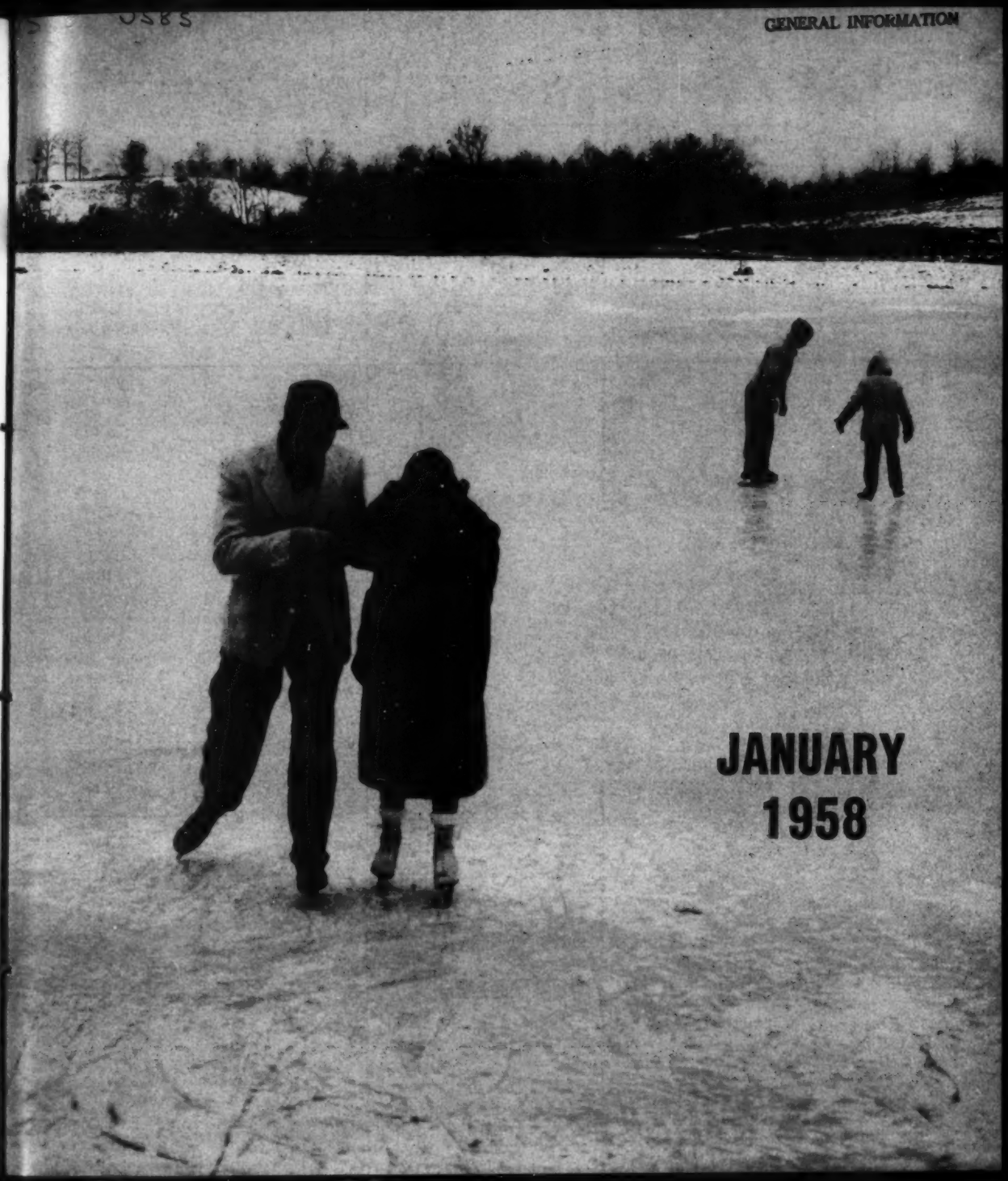

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SOIL CONSERVATION

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SOIL CONSERVATION

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EZRA TAFT BENSON
SECRETARY OF AGRICULTURE

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ADMINISTRATOR, SOIL CONSERVATION SERVICE

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

★ THIS MONTH ★

TOM DALE, Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 18, 1955. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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—EDITOR

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FRONT COVER. — Ice skating on a conservation farm pond in Mercer County, W. Va.

—Photo by John H. Myers

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Farm Hunting Deluxe

By Combining a Hunting Club with Regular Operations a Maryland Conservation Farmer Beats Anything the Indians Ever Had

By HAL JENKINS

PAUL PEARSON, young Marylander who conservation farms about a thousand acres in Montgomery County adjacent to the District of Columbia, has combined a hunting club with the regular operations of one 256-acre farm.

He and his partner, John C. Adams, a real estate and insurance man, call it the Onondaga Club after the Indian tribe that long ago hunted the Potomac Country.

But the Onondaga Indian hunters never had it so good.

Present-day "Onondagas" get the free service of guides and well-trained hunting dogs. They hunt ringneck pheasants 6 months of the year by appointment. The club dresses and quick-freezes or smokes the birds bagged, or delivers them to nearby Normandy Farm Restaurant, for the ministrations of Antoine, Chef de Cuisine, whose Onondaga specialties are Pheasant Saute Chasseur and Pheasant Flambe au Whiskey.

Pearson and Adams feature pheasants because ringnecks normally don't thrive naturally in the area. Ed Mougin, Onondaga's preserve manager who has been a breeder and trainer of hunting dogs for 25 years, stocks the farm with pheasants daily.

But other wildlife abounds naturally in the ideal habitat that has been created on the farm. The club offers hunting for quail, rabbits, and squirrels in season. Hunting for Chukkar partridge and mallard ducks is planned.

Pearson, a supervisor of the Montgomery Soil Conservation District, emphasizes that the farm

Note:—The author is information specialist, Soil Conservation Service, Washington, D. C.

Onondaga Dash points a pheasant for Paul Pearson in a contour strip of corn.

is a working farm. "We plant, till, and harvest crops just as we do on our other farms," he said. "Principal crops are corn, silage, and hay."

Pearson said, "This farm, formerly owned by Lathrop Smith, also a supervisor of our soil conservation district, had a good conservation plan in effect when we took it over about a year ago. All we've done is to make a few changes in the basic plan, with the help of Fred Hazen, SCS technician assigned to the district, and our State wildlife experts."

Pearson explained that all operations are carried on in a way to benefit wildlife but not at the expense of the other farm enterprises. "For example," he said, "we harvest corn both by picker and by cutting and shocking. This gives variety to the food and cover pattern.

"On a modern farm, wildlife is a creature of edges—edges of the cultivated fields," Pearson continued. "And we've got edges galore here—miles and miles of them; and, we have plenty of food and cover—all on the contour."

Pearson is using 12 different mixtures of grasses and legumes. The major plants are barley, vetch, white Dutch clover, sorghums, sudangrass, millet, soybeans, and buckwheat. "These plantings provide excellent wildlife food and cover in addition to crops for harvesting and turning under as green manure," Pearson said. "In some fields we grow 3 crops a year."

Other conservation practices on the farm include 14,000 feet of multiflora rose hedge; 200 feet of stream channel improvement; a half-acre pond; 6,000 feet of waterways; 77 acres of contour stripcropping; and 15 acres of woodland improvement.

Except during the morning and evening peak traffic hours, Onondaga is just about a 30-minute drive from the Nation's Capitol. It is in the heart of an area where farming, although still the major business, is threatened by the urban encroachments of Washington's expanding metropolitan area.

Making the hunting club a part of the farming operation, complete with clubrooms in the farmhouse where Pearson, his wife, and two small daughters live, may turn out to be an experiment in land use that will successfully blend the interests of farm and city people.

That's the hope of conservation farmer Pearson and businessman Adams.

Aerial view of the Pearson Farm.

BRACKISH WATER FOR SUPPLEMENTAL IRRIGATION

By J. LUNIN and M. H. GALLATIN

No. 30

This is the thirtieth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

THE interest in supplemental irrigation in eastern United States has been demonstrated by the rapid increase in irrigated acreages during the past few years. This expansion has been complicated by the lack of adequate fresh water supplies in Seaboard States, especially along the coastal areas. Many farmers in these areas have found that their only adequate supply of irrigation water is brackish. The question has arisen, therefore, as to what extent brackish water can be used, especially for truck crops, without severely injuring the crops or causing damage to the soil.

During the latter part of 1956, a survey was started to determine the extent and nature of the brackish water problem. This survey is being carried out in New Jersey, Virginia, and South Carolina in cooperation with the Soil Conservation Service. At least six wells, well-storage ponds, or seepage ponds were selected as sampling sites in each of these States. Water samples are collected monthly from these sites and analyzed in the Agricultural Research Service laboratory at Norfolk, Va. Soil samples are collected at the same time from areas irrigated by these water sources and are also analyzed. Over a period of a few years, this survey should give much needed information about seasonal fluctuations in the degree of brackishness, the effect of rainfall on salt concentration, and the effect of these waters on soils and crops.

Note:—The authors are soil scientists, soil and water conservation research division, Agricultural Research Service, Norfolk, Va.

There are three general sources of irrigation water for this region: wells, seepage ponds, and rivers and streams. Wells are widely used. In many places, however, the wells are subject to contamination by salt water intrusions or pockets of saline materials in the substrata. The salt water intrusions usually come from an encroachment of sea water into unconfined ground water in coastal areas. Intrusions may also occur in confined aquifers in contact with sea water where the water table has fallen below sea level due to heavy pumping.

Salt water intrusions have occurred in several coastal areas where industrialization has created enormous demands on the local water supply. Increasing demands by municipalities and irrigation farmers have also contributed to the problem. A rapid depletion of fresh water in such areas inevitably creates a danger of salt-water intrusions. Data from the Eastern Shore Peninsula of Virginia on well water analyses indicate that contamination from salt water intrusions have already occurred in a few places.

Farm ponds are becoming an increasing source of water supply for supplemental irrigation. Where these ponds are constructed in coastal areas, they may become contaminated by salt water. In some localities tidal inlets are being used for ponds by placing dams across the inlets and pumping out the salt water. Supposedly, fresh water recharge of such ponds should give water of usable quality. But frequently, sufficient salt remains to contaminate the ponds for a considerable length of time, or the ponds become recontaminated by salt water seepage or tidal inundation.

The proper selection of pond sites is of utmost importance. There must be a sufficiently large watershed to give a fresh water recharge from surface runoff as well as from subterranean seepage. Where dams are constructed in tidal inlets, they must be of sufficient height to

prevent overtopping by tidal waves during storm periods.

One example of overtopping has been observed in the Norfolk area on the Beasley Farm. This particular pond, at the time of first sampling, had a salt content of 240 p.p.m. (parts per million). During a storm in September 1956, tidal waters backed up and went over the dam. After the storm subsided, the pond was sampled and found to have a salt content of 17,880 p.p.m. This could have been avoided if an adequate survey had been made during the planning stage.

Some farms use storage ponds. These are not actually water sources, but reservoirs for storing water to be used when the initial source of water is not adequate for the area to be irrigated. These reservoirs can be used in conjunction with wells, seepage ponds, streams, or drainage ditches. The salinity of the water depends largely on the source of supply.

Another source of water is from streams and rivers. Where these streams and rivers are affected by tidal waters, the salinity decreases gradually with increasing distance from the salt water body. The salt content at various locations and the maximum salt concentration tolerable for irrigation at a particular location must be determined.

Chloride content alone does not provide sufficient information on the fitness for irrigation. Electrical conductivity has been found a much better single value criterion for the degree of salinity. In doubtful cases, a complete analysis may be necessary. The proportions of the various ions present is almost as important as the total salt concentration in determining the fitness of water for agricultural use. It is essential, therefore, when using brackish water to have some knowledge of its composition as well as concentration at time of use.

There are many factors to be investigated in providing a suitable source of irrigation water. Where seepage ponds are adjacent to tidal areas, information is needed about the design and location, in order to minimize seepage of water from brackish sources. The importance of proper dam construction to prevent overtopping during storm and high tide periods cannot be overstressed. Where wells are used in areas subject to salt water intrusions, information is needed concerning the rate at which water can be pumped to keep brackishness to a minimum. A study of the hydrology of these areas is necessary. Storage ponds can be used to ensure an adequate supply of water at irrigation time in conjunction with streams contaminated by tidal waters if water is stored when the lowest possible salt concentration is present. It is also possible that a low-cost method for reducing the salt content of brackish waters to a usable agricultural level may one day be devised.

Statistics indicate that over 90 percent of supplemental irrigation in the East is applied by sprinkling. In most cases little damage to foliage results from direct application of brackish irrigation water. There is, however, a danger of severe burning of plants adjacent to areas under irrigation where the salt spray evaporates on the foliage and builds up salt concentrations on the leaf surface many times greater than that of the water applied.

Perhaps the most important soil factor in brackish-water irrigation is drainage. When using saline waters, it is imperative that no areas of high salt concentration be allowed to develop in the soil. There is no problem in soils having excellent internal and surface drainage. Restricted internal drainage, whether due to

Beans, low salt-tolerant plants, were killed by three 2-inch irrigations with brakish water containing 4,000 p.p.m. of salts.

Beans were stunted but survived when irrigated with two 2-inch applications of water containing 4,000 p.p.m. of salts.

the texture of the subsoil, a hardpan, or a zone of compaction, will eventually cause zones of high salt concentration in areas where brackish water is used, since salts are not flushed out of the profile and evaporation causes salt to accumulate at the surface.

In areas of imperfect drainage, therefore, the engineer can do much toward preventing zones of salt accumulation in the soil. Among the remedial measures used are land leveling, surface drains, subsoiling, and tile drainage. Knowledge of the water-transmitting properties of the soil, subsoil characteristics, and water-table information are essential to good planning.

Internal drainage is important for another reason. Farmers depend upon winter rains to leach out salt accumulated during the summer. Good internal drainage will allow salt accumulations to be leached out of the profile.

A research project was established at Norfolk, Va., in the fall of 1955, for the purpose of studying the factors involved in the use of brackish water for supplemental irrigation.

The small amount of experimental data obtained thus far indicate that several factors must be considered:

1. The relative salt tolerance of crops must be taken into consideration.

2. The amount of water applied per irrigation should depend on the nature of the soil, especially with respect to internal drainage.

3. The frequency of irrigation should be governed not only by the moisture content of the soil, but also by the amount of intervening rainfall and its effectiveness in leaching out salt accumulations. Internal soil drainage should also be considered.

4. The concentration and composition of salts in the water will greatly influence the above factors.

5. Climatic conditions affecting evaporation losses during the crop and rainfall distribution throughout the year are important in determining the salt status of the soil.

6. The nature of the soil itself will determine the degree to which salts can be flushed out of the soil and the extent to which exchangeable sodium can unfavorably influence soil structure or affect plant growth.

With respect to making recommendations, it is not possible to set any specific limit on the salt concentration of water as being "safe." It is necessary to take into account all of the above factors in the use of brackish water for irrigation. Since all of these factors are interrelated, all must be taken into consideration. Studies are being undertaken at present to clarify some of the plant-soil relationships involved in the use of saline waters.

FATHER AND SON.—Othniel Wienges recently succeeded his father as a supervisor of the Calhoun County Soil Conservation District in South Carolina. Since his graduation from the University of South Carolina he has farmed with his father on Singleton Plantation. Their farm operation is diversified, including cotton, small grain for seed, tobacco, soybeans, beef cattle, and race horses. Othniel is, in addition to his other activities, president of the Calhoun Farm Bureau.

O. H. Wienges, Sr., has resigned as soil conservation district supervisor after 18 years. He was elected Calhoun County's first member of the board when the district was organized in 1938-39. At that time, he served with farmers from Lexington and Richland Counties in the Congaree Soil Conservation District, which included the three counties.

When the Calhoun district withdrew from the former three-county district to form a separate county district, Mr. Wienges, Sr. was appointed one of its charter supervisors. He served as its vice-chairman. Under his leadership the educational advisory committee purchased and placed conservation literature in the

libraries, furnished teachers associations with speakers, and held farm tours for the teachers. Each year he attempted to get more conservation taught in grammar schools as a part of the regular school program.

"I am still interested in conservation and will do all I can for the betterment of our community, but I feel that it's time for younger men to assume the leadership," Mr. Wienges remarked as he stepped aside for his son, Othniel, to assume the duties. The board presented Mr. Wienges with a bronze plaque for his outstanding service.

—J. B. EARLE

Poor Land— Rich Land

A Poor Sandy-land Farm is Converted to a Productive Farm Through Soil Building Practices.

By W. A. MASON

"IF this land were any poorer it could only be used as a sandpit," said Everette Kneece as we walked over his 138-acre farm 3 miles northeast of Pelion, S. C., a few years ago.

Yet, through a good land use and management program, this sandy-land farm is now paying for itself and showing a profit.

Kneece bought the 138 acres several years ago from John Joyner for $800. Joyner had bought it several years before from Frank Harmon for $600.

"I wouldn't take $5,000 for the place today," said Mr. Kneece. "I paid for it the first year by selling truck crops from 3 acres of the best land."

In the County Farm Bureau Corn Contest in 1954, Kneece averaged 74 bushels on 5 acres. To produce such yields he has to keep adding organic matter to this thirsty-type soil. Soybeans that were planted in 1957, after sericea, yielded about 25 bushels.

On another field, Kneece has planted Bahiagrass in rotation after he had seen the outstanding yields a neighbor got from squash after turning under Bahia for soil improvement.

Luxuriant growth of soybeans on the Everett Kneece farm.

In the spring of 1953, a 14-acre sand field was planted to coastal bermudagrass. Kneece began to let his cows graze this field in 1954 and has done so every year since. Early in 1957, he put 50 loads of chickenhouse litter on this field. He also applied 500 pounds of 3-12-12 fertilizer per acre and later added 300 pounds of 20 percent nitrogen per acre.

He kept 13 cows on this 14-acre field from March through September in 1957. Even while the cows were on the field, he cut 500 bales of hay that averaged 60 pounds each, and he got another cutting of hay before frost.

"I'm not going to destroy any of my pines, but I am going to clear up all of my land in Blackjack oak and plant it to Bahia or coastal bermudagrass," Kneece said.

His plan of operations was worked out with the assistance of SCS technicians servicing the Lexington Soil Conservation District with which he is cooperating.

Note:—The author is management agronomist, Soil Conservation Service, Newberry, S. C.

FARM POPULATION.—Recent estimates of the Bureau of the Census show that the farm population of the United States was only 12 percent of the total population in April 1957. There were 20,396,000 people living on farms, according to the estimate. This contrasts with the more than 25 million farm population in 1950, when farm population was 16.6 percent of the total population of the Nation.

Are We Getting The Job Done?

A District Supervisor Answers His Own Question in This Article by Telling How His District Achieved Success Through Community Effort

By MIKE SMITH

THE Nueces-Frio-Sabinal Soil Conservation District is much like other districts in the United States. All districts have people, land, water, and plants. Take these four things, encourage them to work together, and you have conservation.

Supervisors in all districts must have help to carry out a successful conservation program. If a board of supervisors will enlist the help of all available citizens, groups, and organizations, they cannot fail to fulfill their obligations as governing bodies of soil conservation districts. But, first, the supervisors themselves must have the interest and desire to serve and devote some time to the job.

Our district has achieved statewide fame in Texas by winning numerous awards in the past 4 years. We know this came about by the use of the resources we had available in our people. The supervisors, themselves, did not accomplish these feats alone. They received help and lots of it.

How did they get this help? This is how they proceeded: A planned program for each month of the year was made, and the supervisor best qualified to handle the particular program or project was designated to do so. The responsibility of promoting a plan of action rested entirely on that supervisor. This was a "must", since there are so many jobs each supervisor and his district should be doing. But it was up to the other supervisors to help him and back him in his work.

It was found that Boy Scouts, civic clubs, garden clubs, wildlife associations, schools, and practically all other organizations in the district had a committee on Farm and Ranch, Agriculture and Conservation, or whatever they wished to call it. The trouble was that most of the committees did not have any definite projects on which to work. When we discovered that, we gave them suggestions and asked them to help us on our program.

Clergymen, teachers, bankers, and many businessmen were anxious to help when asked, and were a great help. The more people we were able to involve in a project, the more the project was publicized and talked about. Pastors throughout the district took more and more interest in conservation. For the past 4 years, more than 20 churches out of the 25 contacted have observed Soil Stewardship Sunday. We buy booklets and church bulletins for them. This is an important program and districts make a grave mistake when they do not encourage it.

Another step we take in planning the year's work is to discuss the problems and needs of the district with those men who serve districts so well and faithfully—the Soil Conservation Service technicians.

District supervisor, J. V. Porter (standing), and committee work at selecting best essays on conservation.

Note:—The author is a supervisor of the Neuces-Frio-Sabinal Soil Conservation District, Texas. This article is a digest of a speech made by the author at the annual conference of the Association of Texas Soil Conservation Districts, Tyler, Tex., January 1957.

Telling the conservation story is about the most important job of district supervisors. We have a grassplot display at the sales barn with 57 varieties in it. A sign reads, "To understand and know plants is the first step in conservation ranching." Several business houses put up large pictures of local conservation practices at which they point with pride. All these displays are kept current.

One of our activities that we are most proud of is the education program on conservation of soil, water, plants, and wildlife in our four public schools.

Here is how we started it:

In 1953, J. V. Porter and John Monagin, both supervisors, suggested that the district try to get the local schools to teach more about conservation of natural resources. It was found that 90 percent of all students graduating from high school never were taught any conservation except a little in Science classes. It was decided to invite all school superintendents in the district to our July meeting and to present the problem to them.

We called on A. C. Spencer of the State soil conservation board to attend this meeting and help us. All of our school superintendents attended. M. B. Morris, superintendent of Uvalde schools, invited the supervisors to bring a program to the next area teacher's meeting, in October 1954. The board accepted and asked Howard Boswell, our State executive director and editor of *Soil and Water*, to give a program on "Teaching Conservation in the Public Schools" for a group of 130 teachers. John Beard, of the SCS, showed some slides on conservation, and he outlined what the district and SCS could do to help them with this program. It was a success. We gave them a list of agencies, groups, and individuals who would help them with programs and conservation tours.

Did this pay off? Well, last year for instance, 771 students wrote essays on conservation, more than 100 boys entered our annual range and soil judging contests, and all schools put up conservation displays during public school week. The staff of West Main Junior High School of Uvalde now teaches a full semester course on conservation.

Local citizens help judge the school essay

School Superintendent M. B. Morris discussing the importance of conservation with schoolchildren.

contest each year. This is a huge job and a lot of help is needed. We found that local people felt honored when asked to help. All winning essays are published in local papers to give students recognition and to create more interest for the future. The names of the judges are also publicized.

Every year we have a wildlife tour in cooperation with our local wildlife association. The association sends landowners to the district for wildlife conservation plans. The annual tour attracts absentee landowners, district cooperators, sportsmen, and city dwellers.

The wildlife association cooperates in selecting men who do outstanding work on wildlife conservation for awards. Their secretary, Garvis Marsh, assembles the information for award entries. It is quite a job to write up awards, and again, outside help is needed. Several people in the district help in this undertaking and are always thanked for a job well done.

Press and radio give recognition to those who cooperate with our projects and programs. This gives encouraging results, because people are pleased to hear their names over the radio and to read about themselves or are interested in the activities of a neighbor or friend. When a certain project is completed, praise and thanks always are given to those persons who cooperated to make a success of the undertaking.

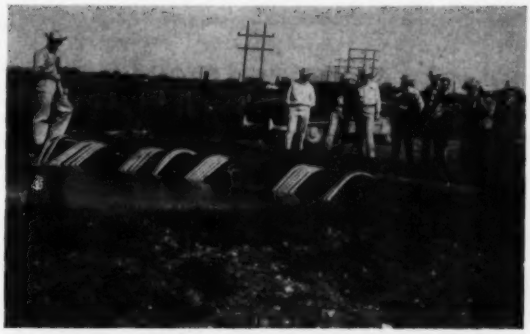
A shining example of local help to our district developed after the district learned the possibility of getting a grant of seed-cleaning

equipment from the Soil Conservation Service. All local groups were mustered to develop a plan of action for getting and using this equipment. We presented a plan on how we intended to operate it. People donated trucks and labor to tear it down in San Antonio and set it up in Uvalde. The city of Uvalde gave us a building to use. Dave Foster, a local cooperator and seed grower, gave days of free time to supervise the entire project.

In 1956, the value of K R bluestem, blue panic and buffelgrass, cleaned in the plant was $276,541.80. Some 122,600 pounds of buffelgrass, 31,215 of blue panic, and 26,923 of K R bluestem were cleaned. This doesn't take into consideration other grasses and small grain. The district's payroll is close to $8,000 a year. We are not trying to make a lot of money. Our main goal is to be of service to landowners and break even. So far, so good.

During the past 4 years our district has won its share of awards. We have won two State awards in the Frank M. Woods Wildlife Awards program, and one year were selected regional winner. In the National Goodyear Conservation Awards program we won second place in 1955 and first place in 1956 as the "Outstanding District" of Texas. We were State Champion in the *Fort Worth Press* Awards program on wildlife in 1956. We had the regional "Outstanding Farmer" in 1956. Our businessmen have been selected in the region as individuals rendering the most unselfish service to districts for 3 years straight. These men were: Eric Beecroft, Dave Foster, and Roy Kothmann. One of our local students had the champion essay one year with several placings in other years. At the 1957 State convention we were given a beautiful plaque as State Champion in the National Farm Life Insurance Company Awards program for "The Most Effective Use of All Groups." We used the $200 cash award to purchase a camera. In 4 years, we've won 22 State and regional awards.

FFA and 4-H Club boys participate in range judging contest.



Bankers attend tour on conservation irrigation.

We have a District office that is all our own. The district having its own office helps distinguish the difference between SCDs, SCS, and other agencies and groups.

I close by saying to all fellow district supervisors: If you are not willing to serve, then get off the board, because you're dead weight. Be interested, be active, and never fail to put in a good word for districts. You must make a few calls on people if you want results. Your district will only be as good as you make it. If districts fail, if people reject the conservation responsibility, which they must accept in a democracy, then I ask you, what comes next? We know the answer to that. The Government might have to take over and force the "must conservation" on us. We don't want this to happen.

The Nueces-Frio-Sabinal Soil Conservation District will continue its attitude and its plan of action. We hope to encourage more conservation and accomplish even more in the future. With the help we so generously received in the past, we will be able to achieve our goal. We've had a 7-year drouth down here, too, but we didn't use that as an alibi for stopping our conservation efforts.

Ponds for Irrigation

Small Range Cattlemen in Utah Find It Difficult to Subsist Without Ponds for Summer Irrigation of Hayfields.

By C. W. ZUMWALT

THE southwestern corner of Utah has a low-elevaton area commonly known as Utah's "Dixie," a hot desert country. Temperatures of 115° in the summer are not uncommon, and there are long periods of 105° to 110°.

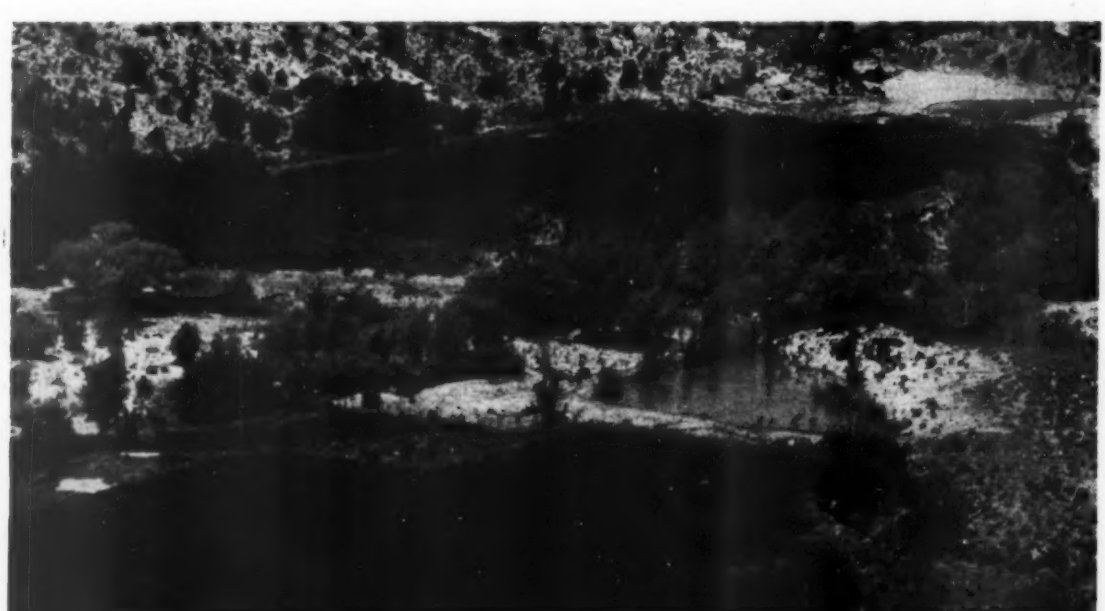
Wherever a small stream of water can be found in this desert it is a foregone conclusion that a lot of the water has been lost along the course through seepage. What is left, the sun seeks out, and evaporates with merciless dispatch. If by chance there is a stream of water left after a few hours in the sun and sand, it is rarely large enough to irrigate with.

Several long canyons run through the Lower Virgin-Santa Clara Soil Conservation District. These canyons drain the watersheds of a range of mountains that form a rim along the northern edge of the district ranging from 7,000 to 10,000 feet in height.

Small, clear streams start down these canyons and are often supplemented by springs along the way. In early spring there is usually enough snowmelt to furnish quite a lot of irrigation water; enough, in fact, to irrigate all of the farms in each canyon at least once. Spring usually ends in April; and May begins the long, hot, dry summer.

As the heat of summer begins to bear down, the business of irrigating becomes a mute battle between man and the burning sun over a trickle of water. More often than not, the sun wins the battle. By September, what is left of a small hayfield is hardly worth mentioning. At least this was the story a few years ago.

Note:—The author is work unit conservationist, Soil Conservation Service, St. George, Utah.



Two of the ponds and alfalfa fields irrigated from them on the Henry Bowler ranch.

Ranchers settled these canyons in the early days of Utah's history—1860-70. Ranching in those days amounted mostly to keeping the cattle branded and scattered to the best feeding areas. Irrigation farming was done only on home gardens, fruit trees, and small hayfields used for wintering weak cows.

The few level spots along the canyon bottoms were hunted out and used for these small hayfields. Irrigation water was diverted out of the canyon bottom by means of temporary rock and dirt dams into ditches that snaked their way around cliffsides and through talus slopes onto the small fields.

In many respects, modern day ranching is not as easy as it was a few decades ago; competition is much keener. Factors, such as overgrazing, market demands for better beef, and an economy demanding a better calf crop and a healthier herd have all helped make it difficult for the small cattleman. He is just about forced to raise more and better pasture and hay to supplement scanty range feed to put his business on a dependable footing.

Recent drought years in southern Utah have made the situation critical. All stockmen feel more secure if they can go into the dry winter months with a good supply of alfalfa hay in the stackyard. The winters aren't cold, but there is just not much feed on the desert ranges.

Some ranchers in the desert canyons have been in favorable places along the streams. In good years they were able to divert large enough streams to irrigate two or three small fields of hay. They would get one or two fairly good cuttings of alfalfa during a year of good water supply. Even then it was difficult to get a large enough stream to do a good job of irrigating.

Let us take the story of Henry Bowler of Gunlock, Utah. Henry and his two brothers, Dick and Lewis, run a ranch in McGotsue Canyon near Gunlock. Each of the brothers has what he calls "his own" portion of the ranch, but the place is really a teamwork outfit. Throughout the ranch's length of several miles of canyon country, are about 9 or 10 spots level enough to farm and irrigate. Each of these spots is 2 to 8 acres in size.

McGotsue Creek, in the spring, starts flowing with a flourish and gives the impression of a continuously ample water supply. Each of the fields get a good irrigation, then summer comes and the creek dwindles to a trickle.

Henry Bowler opens the valve on one of his ponds while SCS engineer looks on.

The only way the Bowlers could manage an irrigation was to stay right at the bank of the stream and gingerly transfer its water by hand from row to row onto the best fields. The other fields, for the most part, would just dry up.

On one such perennially "dried up" field Henry usually gambled on getting a good water year and tried some kind of a crop. Once in awhile, when the snow pack was deep in the mountains, he would get a good crop of barley on this 2½-acre field. Usually, though, he planted a few rows of melons and nursed a small stream of water through them the whole summer. With about 4 rows of melons Henry could sell a few and have melons for his family and neighbors. Sometimes he would sell from $50 to $100 worth of melons to the stores in St. George, some 20 miles away.

In 1951, Henry was elected as a supervisor for the Lower Virgin-Santa Clara Soil Conservation District. In the process of developing a conservation plan on his place he hoped to find

A fresh cutting of alfalfa on one of Bowler's irrigated fields.

a site for a small farm pond. He believed that by running the small McGotsue Creek into a pond for a few days he could store enough water to furnish a good irrigating stream.

A pond site was hard to find on the rocky canyon sides, but by tramping over the hills together, Henry and the SCS engineer were able to locate a suitable pond site.

Late in 1953, he built a pond for this 2½-acre field where he could usually depend on getting a few rows of melons. He sowed the field to barley and alfalfa early in 1954. In 1955, he harvested 455 bales of alfalfa, averaging 60 pounds each from the 2½ acres. In other words, he realized 13½ tons of baled hay from this field. In 1955, that much hay was worth $340. In addition to the baled hay, Henry had several weeks of good fall pasture on the same field. The pasture alone was worth more than any of the previous melon crops. The 1957 hay crop was even better.

The pond was built in cooperation with the Agricultural Conservation Program for a total cost of $552. The ACP payment was $286; thus, Henry's total cash outlay was only $266.

Henry is so enthusiastic about using farm ponds to accumulate water that he now has three ponds for as many fields. He and his brothers together have seven ponds for nine fields.

Some people might question the economics of having a pond for each small 2- to 8-acre field, but Henry Bowler understands this kind of economics better than most. He is still in business and frankly admits that he would be in pretty bad shape if it were not for those ponds. If you ever want to see a proud irrigator, go with Henry when he opens the valve on one of his ponds.

Many other ranchers in a similar situation have adopted this idea of water conservation. The Lower Virgin-Santa Clara Soil Conservation District now boasts 119 farm ponds constructed with district technical assistance and ACP financial help. Of these 119 ponds, 75 were built for the same type of situation as the 7 ponds on the Bowler ranches.

Conservation has many ways of making life better on the desert; a farm pond formed from a tiny desert stream is one of the best ways. Land leveling, improved ditch work, and concrete ditch lining are also good desert farm practices, but in this canyon country the pond has to come first.

DISTRICT PROFILE

ALFRED BAYLOR of NEW JERSEY

IF you are driving through northern New Jersey and a cloud of dust streaks by, don't be alarmed: It's probably only Alfred F. Baylor on his way to keep one of his many appointments.

Baylor runs a 297 acre dairy and poultry farm a mile north of Delaware, N. J. He keeps 100 Holstein cows and 4,500 white Leghorn laying hens. That should be enough to keep the man busy; but, Baylor finds time for a lot of other things, especially soil and water conservation.

Alfred Baylor first became interested in soil conservation in 1951, when he built 1,800 feet of diversion terrace; his first conservation practice. Since then he has continued to carry out a

complete and dovetailing conservation program. In the past 6 years he has added nearly 1,900 feet of diversion terraces. He has changed from old-fashioned straight-row farming and put contour strips on 120 acres. To make the change he had to remove 8,000 feet of stone fence and hedgerows. The farm had been split into fields too small for contour stripcropping.

Rotating soil-improving, with soil-depleting crops is another conservation measure Baylor has installed. That way he keeps his soil in good condition. It's easier to work and produces more. With an eye to the future, he has planted an acre of locust trees to furnish fence posts.

To avoid wet spots, Baylor has put in almost 2,800 feet of tile drains. With his own bulldozer, he has built a 1-acre farm pond and stocked it with bass and bluegills. The pond provides food, fire protection, and recreation.

Baylor was appointed a supervisor of the Warren County Soil Conservation District in 1952. In 1953, his fellow supervisors elected him chairman, a post he has held since then.

The Pequest watershed was set up as a pilot watershed protection project in 1953. Baylor was elected chairman of the Pequest Watershed Association, an office he still holds. The Warren and Sussex County Soil Conservation Districts sponsored the project jointly. When the local people organized the Paulinskill watershed project in 1956, Baylor was elected chairman by the sponsoring agencies.

Baylor worked long and hard to get the easements needed before the Pequest watershed work could start. He organized Soil Stewardship Sunday services in Warren County. The Warren County Soil Conservation District won the Goodyear Conservation Contest in 1953-54. Baylor accompanied the district's outstanding farmer, Norman Schnetzer, on a 10-day trip to the Goodyear conservation farms at Litchfield Park, Ariz. At the farms, Baylor took movies of the conservation practices. He has since shown the film all over New Jersey, letting city and rural people alike see what conservation farming looks like and what it means in soil protection and higher production. He also gives talks on conservation before local Granges and service clubs.

Alfred F. Baylor

Just a listing of Baylor's organizations shows what a busy fellow he is. He is vice president of the New Jersey Association of Soil Conservation Districts, master of Pomona Grange, treasurer and past master of Moravian Grange, past president of the Warren County Board of Agriculture, president of the Warren County Fair Association, treasurer of the Knowlton Township Board of Trade, former mayor of Knowlton Township, chairman of the Producers Association of Welshes Creamery, and president of the Board of Trustees of Hope Methodist Church.

He is also a member of the local Selective Service Board, State and County Poultry Growers Association, Belvidere Rotary Club, Masonic Lodge in Belvidere, Shrine of Valley of Trenton, West Jersey Shrine Club, and the Tall Cedars of Phillipsburg.

—DON WOLFF

Progress in 1957

By D. A. WILLIAMS

AS the soil and water conservation program continued to expand in 1957, the scope and versatility of the Soil Conservation Service's responsibilities and activities increased. The Service had whole or partial responsibility for administering or providing technical assistance on 15 programs of the Department.

The activities and programs included: Planning and technical assistance to 2,751 soil conservation districts; the national soil survey, works of improvement on 11 watersheds authorized for flood prevention; demonstration of the value of watershed treatment measures on 55 pilot projects; cooperation with local organizations in watershed protection projects as authorized under Public Law 566, as amended; completion of water conservation and utilization projects under the Case-Wheeler Act; leadership in the long-range Great Plains Conservation Program; making cooperative snow surveys and runoff predictions for 11 Western States; leadership in the Department's conservation needs inventory; technical assistance on interagency river basin investigations; providing statistical and technical data to State legislative and executive agencies on conservation problems; technical aid on soil- and water-conservation problems to the Agricultural Conservation Program, Soil Bank, Rural Development, and Conservation Loans programs.

In addition to the expanding scope of conservation activities, several significant and encouraging trends were noted for the year. One was the display of greater interest and assumption of leadership on the part of State and local agencies.

Many States provided increasing amounts of funds for clerical and other aid to soil conservation districts. Some States furnished watershed planning parties to supplement existing SCS planning services on watersheds eligible for Federal assistance under P. L. 566. Several States requested and received historical, factual, and technical information from SCS specialists on problems for which new legislation seemed to be needed, especially on water rights and related water resources problems.

County and township governments also increased their participation in the conservation program. These local governing bodies gave both financial and physical support to the conservation movement in many ways. Heavy equipment, used primarily for road building and maintenance, was made available for earth moving conservation jobs in many localities. Financial support from these local tax raising authorities was given to an increasing number of soil conservation districts, watershed associations, and other conservation organizations. Municipal and other local government agencies also contributed more, both in financial and physical assets, toward advancing the conservation movement than ever before.

A definite trend was noted toward increased participation in the conservation movement by privately owned corporations and companies and by non-land owning individuals and groups. Industrial companies that get most of their raw materials from the land, are giving more and more support to the type of conservation that can assure them of a continuity of supply. There has been a great increase in the number of private contractors, especially those with earth moving equipment, who devote a large part or all of their time to conservation work. Farm equipment manufacturers and dealers are devoting more and more attention to conservation work and better types of equipment for doing it.

The most pronounced development in local leadership, however, has been the increased activity of soil conservation districts, watershed associations, and other local organizations concerned mainly or wholly with soil- and water-conservation work. Such local organizations are assuming leadership and taking responsibility for any or all conservation activities in many

Note:—This article is a digest of a report submitted to the Secretary of Agriculture by the Administrator of the Soil Conservation Service for the fiscal year 1957.

areas. This is a healthy situation. It gives a truly locally-sponsored and locally-directed conservation program in those areas.

Where urban or municipal interests have teamed up with agricultural interests in a community the conservation program has advanced much more rapidly. In some cases the urban leaders and people have been drawn into the conservation movement because of critical problems that directly affect them, such as floods or threats to municipal or industrial water supplies. In many cases, however, civic clubs, industrial groups, and others have adopted conservation as a major objective in their programs simply because they wish their community, State, and Nation to remain strong and progressive.

Regardless of the motivating factors, the conservation movement must have this urban support if it is to succeed, because about 88 percent of our citizens are urbanites. The 12 percent that are engaged directly in agriculture cannot bear the full load of conserving the Nation's basic resources. They must have moral support, and often physical and financial support, from the other 88 percent of our population. Fortunately, farmers and ranchers are getting such support to a greater and greater extent.

Another development that appears significant is the expanding use made of soil surveys. Urban and suburban developers, highway engineers, tax assessors, health departments, industrial developers, and other groups are recognizing that the present type of soil surveys furnish basic information which helps plan and execute programs involving land.

Soil Conservation Districts

Farmers and ranchers organized 62 soil conservation districts during the year. This brought the total number of soil conservation districts (including 10 grass conservation districts and the Imperial California Irrigation District) to 2,770 in the United States, its territories and possessions. At the end of the fiscal year the Department and the SCS were assisting 2,751 districts, 51 more than a year earlier.

Approximately 93 percent of all farms and ranches and 88 percent of all agricultural land in the Nation are now in locally administered conservation districts.

During the year, 122,492 farmers and ranchers operating about 38 million acres became cooperators with their local districts. At the end of the year 1,727,682 active district cooperators were operating about 515 million acres.

Soil Surveys

Soil surveys suitable for farm planning were completed on about 34.8 million acres during the year. (About 20.1 million acres were standard soil surveys, while 14.7 million acres were soil conservation surveys.) Range surveys suitable for ranch planning were completed on about 13 million acres. Soil surveys were about 10 percent greater and range site surveys 16 percent greater than the preceding year.

The main emphasis was on increasing the acreage of standard soil surveys (surveys in which the soil mapping units fit into the national classification scheme). The acreage of standard surveys has quadrupled during the past 3 years. In the meantime, the acreage of soil conservation surveys, (made mainly to furnish the information needed for immediate use in farm planning) declined. Considerable progress was made in the conversion of soil conservation surveys and other types of surveys to standard soil surveys during the year.

A program of mapping and measuring sample areas was started to provide information needed for the national inventory of conservation needs in counties where detailed soil survey information is not available. Additional soil scientists were transferred or detailed to the Great Plains to help expedite the soil survey program in critical areas of that region. The cooperative program with the Bureau of Public Roads for obtaining and interpreting data on the engineering aspects of soils was continued.

Work is continuing on capability and other interpretive soil groupings and on estimates of crop yields under various levels of management. Field studies to establish capability class benchmarks for key soils were carried on during the year.

Nine soil survey reports with maps were published during the year. At the end of the year, 47 soil survey reports were in the Government Printing Office awaiting publication. In addition, 33 reports were in the process of editing and map compilation.

Efforts to revise the nationwide system of soil classification were continued. A fifth approximation was completed and distributed to soil scientists during the year. The final classification should be completed within the next 2 years. Progress was made on the basic World soil map, though this project is far from completion.

Farm and Ranch Planning

The Service assisted more than 1 million farmers and ranchers in developing conservation plans, revising existing plans, or in applying parts of their conservation plans during the year. Basic conservation plans were completed on 92,660 farms and ranches, covering more than 27 million acres. Basic plans were revised on an additional 11,065 farms and ranches, covering nearly 5 million acres. Through progressive planning procedures many thousands of other farm and ranch plans were advanced from an initial to an advanced stage.

At the end of the year more than 1.7 million soil conservation district cooperators, controlling more than 515 million acres of land, were using conservation plans that SCS technicians had helped them develop. Of these,

1,161,745, with about 326 million acres, had basic conservation plans on their farms and ranches.

Group Planning

Service personnel provided technical assistance to soil conservation districts, in laying out 2,398 group drainage jobs affecting nearly 3 million acres and 1,079 group-irrigation projects affecting more than 2 million acres. These figures do not include watershed activities on established watershed projects.

Watershed Planning

The development of work plans for entire watersheds received continued emphasis. At the end of the year watershed planning parties, usually consisting of 4 or 5 professional employees, had been authorized for 42 States with smaller parties in other States and territories as needed. The recruitment and training of technicians and aides for watershed planning continued.

Applications for assistance on watershed protection work, under P. L. 566 were received from 165 small watersheds during the year. This brought the total number of applications received for watershed planning assistance to 712 from 46 States and Hawaii. During the year, 96 applications were approved for work plan development, bringing the total watersheds approved for planning to 268 in 45 States. Twenty-nine projects were approved for operations, making a total of 42 in the operations stage. At the end of the year 27 tentative and 22 final work plans were being reviewed for operations.

Work plans were developed for 21 subwatersheds in the 11 watersheds authorized in 1944, for flood prevention work. This brought the total of subwatershed work plans completed on these projects to 150.

Modified program reports were completed for the Little Sioux and Coosa watersheds. This completed the modified surveys and reports authorized for 9 of the watersheds in this program. From these reports, it was determined that the estimated Federal and non-Federal costs of the flood prevention program are 43 percent and 57 percent respectively.

At the close of the year, 55 pilot watershed projects were active or completed. Operations on 3 projects were terminated during the year at the request of the sponsors. At the end of the year 1 project was fully completed, 19 were more than 90 percent completed, and 25 were from 50 to 90 percent completed.

River Basin Planning

With the assistance of other agencies, comments were developed for the Department of Agriculture on 22 proposed reports of the Corps of Engineers, on 8 proposed reports of the Bureau of Reclamation, and on 1 report of the Public Health Service.

Service personnel represented the Department on the Arkansas-White-Red Rivers, Columbia River, Missouri River, and Pacific-Southwest Interagency Committees, and on the Northeastern Resources Committee concerned with river basin planning.

Land Treatment

The major objective of the Service, as it has always been, is to help farmers and ranchers treat their land in such a way as to assure a maximum of soil and water conservation while increasing efficiency of agricultural production. Soil and range surveys, conservation plans, and technical aid in establishing conservation practices on farms, ranches, and entire watersheds are among the main tools the Service has used.

Progress in land treatment is not necessarily measured by the extent to which individual conservation practices are used. A true conservation program must be based on the use of all land within its capabilities and treatment of each tract according to its needs for protection and improvement. Nevertheless, conservation farming or ranching is done mainly by land use adjustments and by applying individual conservation practices and combinations of practices according to the need. Hence, progress may be determined, to a great extent, by measuring the amounts of certain important conservation practices that have been applied to the land.

The following table summarizes the application of some of the most commonly used conservation practices for the Nation as a whole.

Conservation practices newly applied in soil conservation districts, with SCS assistance, 1957.

Contour farming	acres	2,660,044
Cover cropping	"	4,110,385
Stripcropping	"	896,016
Seeding range and pasture	"	3,431,427
Tree planting	"	472,435
Drainage	"	1,301,445
Irrigation land leveling	"	581,245
Improved water application	"	1,410,890
Terracing	miles	50,937
Farm and ranch ponds	number	81,178

When heavy spring rains of 1957 broke a 5- to 7-year drought in central and western Texas, tests showed that conservation farming and ranching helped balance wet spells against droughts. SCS technicians in 120 work units of Texas dug holes or made borings to see how deep moisture had penetrated into the drought parched soil. These field checks included 133 paired observations comparing protected and unprotected land under otherwise similar conditions.

These tests consistently showed that moisture penetrated about twice as deep in fields and pastures that had proper conservation treatment as it did in areas without conservation treatment.

For example, on 40 cropland fields with conservation treatment, moisture had penertated the soil to an average depth of 59 inches. On 40 similar fields without conservation treatment, the moisture had penetrated only 36 inches. On 93 pastures and ranges with good cover or conservation treatment, the moisture pene-

trated to an average depth of 37 inches, while on 93 similar pastures and ranges with poor cover and no treatment the average depth of moisture penetration was only 13 inches.

Flood Prevention

Progress in installing structural works of improvement on the 11 watersheds authorized for flood prevention in 1944 was excellent. During the year, 150 floodwater-retarding structures were designed and contracted for, while 73 such structures were completed. This makes a total of 455 of these flood-detention structures that have been installed to date with a floodwater capacity of 268,020 acre feet.

Altogether, 1,319 stabilizing- and sediment-control structures were completed this year, bringing the total of such structures now installed on the 11 watersheds to 6,506. Channel stabilization and improvement was completed on 141 miles, a total of 1,111 miles. Levees and dikes were completed on 1.2 miles this year, bringing the total to 30 miles that required 437,679 cubic yards of earth fill. Roadside erosion control work was done on 467 miles and 37,515 acres of critically eroding land were revegetated with grass, legumes, or woody plants on the 11 authorized watersheds.

Structural work was accelerated on the 55 active pilot watershed projects. During the year, 68 floodwater-retarding structures were completed, making a total of 206 such structures with 107,328 acre-feet storage capacity. Altogether, 91 stabilizing, and sediment-control structures and 41 silt and debris basins were completed. This makes totals of 1,547 sediment-control structures and 189 debris basins now installed in these watersheds. Stream channel stabilization or improvement was done on 54 miles making a total of 157 miles now completed. Roadside erosion control work was done on 34 miles and 4,014 critically eroding acres were revegetated.

Structural work was started on watershed projects authorized under P. L. 566. During the year, 46 floodwater-detention dams were designed and contracts were let for construction of 21. At the end of the year 8 floodwater-retarding dams, with a capacity of 800 acre feet had been completed. In addition, 6 miles of channel improvement work were completed. Operations on these projects should accelerate rapidly during the next few years, since planning work is now well advanced.

Torrential rains in central Texas and Oklahoma, in the spring of 1957, proved the value of the flood prevention and watershed protection work. Treated watersheds had little flood damage, while similar streams nearby, without watershed protection work, had devastating floods.

For example, 138 upstream dams combined with land treatment measures in the Upper Trinity watershed of Texas prevented estimated damages of more than $1 million to crops, pastures, livestock, homes, buildings, roads, bridges, and utilities during the floods of May 1957. The savings were mainly on valley bottoms in tributary watersheds of the Trinity. The dams, which supplemented soil- and water-conservation practices on the land, temporarily held about 122,000 acre feet of floodwater and trapped 3,000 acre feet of sediment that otherwise would have moved downstream to heighten flood crests and clog downstream channels and reservoirs.

Agricultural Conservation Program

Technicians of the Soil Conservation Service continued to assist Agricultural Conservation Program participants with permanent-type practices on which cost sharing was requested. Certifications for need or practicability, assistance with site selection and layout, supervision of installation, and certification of compliance with specifications were provided on 400,682 farms and ranches whose operators were participating in this program. Such assistance was given on the permanent-type practices which will provide enduring conservation benefits to the land as specified in the national ACP bulletin.

Great Plains Conservation Program

The program development phase of the long-term conservation program for the Great Plains, as authorized by Public Law 1021, was completed during the past year. The Soil Conservation Service has been designated as the Department agency to take the lead in administering this program.

This program will further help farmers and ranchers of the region develop long-time plans for their land including soil- and water-conservation measures and the land use adjustments needed to achieve a more stable agriculture. It provides technical aid and cost sharing assistance over a contracted period of years to farmers and ranchers in designated counties in applying measures as part of an approved plan. The program is scheduled to go into operation during fiscal year 1958.

Snow Surveys

In cooperation with other Federal, State, and local agencies, and private enterprises, SCS obtained accurate snow pack information on about 1,240 snow courses in the Western States during the winter and early spring of 1957. In addition, information obtained from British Columbia on the snow pack of the upper Columbia River watershed was made available to farmers and other interested people as a part of the spring runoff prediction. The availability of runoff information early in the spring and estimates of the amount of water that would be available for irrigation not only helped irrigation farmers plan their cropping systems, but also informed all citizens of the area regarding the possibility of floods and the probable water supplies during 1957.

Soil Bank

The Service provided technical assistance to 15,330 Soil Bank participants during the year. This help included general counseling with farmers and ranchers about the Acreage Reserve and Conservation Reserve phases of the program. SCS technicians gave direct assistance to participating farmers and ranchers in

selecting lands to be placed under contract and installing treatments for longtime protection.

Conservation Needs Inventory

Agreement was reached during the year by the Department interagency committee on policy and procedures for making the national inventory of soil- and water-conservation needs. Field work should start early in the coming year. The goal for completion of the inventory is set as 1960.

The inventory will encompass two main phases: (1) an inventory of land use, conservation problems, and acreage needing treatment, and (2) an inventory of watershed project needs as authorized by P. L. 566.

Conservation Loans

The Service continued to advise the Farmers Home Administration on the feasibility of conservation loans and gave technical assistance on soil- and water-conservation practices for which such loans were made. During the year, such aid was given on about 1,600 farm and ranch loans made by FHA that totaled about $9.5 million.

Rural Development

Technical aid on soil- and water-conservation measures was given to 3 312 participants in the Rural Development Program that is being carried out by the Department to help low income farmers and ranchers in designated counties.

Water Conservation and Utilization

Only one water conservation project, authorized under the Case-Wheeler Act of 1940, was in operation. That was the Eden Valley project in Wyoming. Land development is continuing on the revised schedule adopted in 1956. Progress for the year was satisfactory. It is expected that this project will be completed and closed by 1962.

A DRAIN FILTER GUIDE THAT WORKS

By F. A. MARK, OLIVER D. JEFFORDS,
and CARL W. WALKER

A TILE drainage filter usually is a layer of pervious material placed around the tile to facilitate ground water entry into the tile and prevent both erosion of the soil and subsequent damage to the drainage system.

There are two main requirements for a good filter: First, it should be more pervious than the base soil it is protecting in order that there will be no hydraulic pressure built up, and second, the voids between the filter particles should be small enough to prevent particles of the base material being washed into or through the filter. Clogging of the filter or excessive settlement of the tile line due to erosion may occur if the filter is not properly designed.

Meeting the above requirements, in many situations, may become a time-consuming task. Fortunately, the groundwork has been done for arriving at answers to the essential criteria. In 1940, G. E. Bertram of Harvard University published a report of an experimental study of filter requirements setting forth fundamental relationships. This was followed by studies of the Corps of Army Engineers at the Vicksburg Waterways Experiment Station. Still further research was done by the Bureau of Reclamation and the Agricultural Research Service. Definite standards have been set up in size relationship for stability.

The remaining problem was how to get this scientific approach to drain filters in a working form so that the latest and best could be incorporated in tile drainage practice. In working in the irrigated area of the Yakima Valley with its many drainage problems, engineers recognized the need for using laboratory mechanical analysis of soils and filters in the design of drainage systems.

A program was started for gathering soil samples by series and local filter materials for analysis. We used the SCS laboratory at Portland, Ore., for making mechanical analysis of the soil samples. Sieve tests for filter materials were done at SCS area headquarters, Yakima, Wash.

As results were charted, it was concluded that the analytical findings should be cataloged and made available to field engineers, so that as drainage work was done on similar soils it would be unnecessary to wait for tests. Standard forms for mechanical analysis of soils were

Note:—The authors are respectively, deputy State conservationist, Spokane, Wash., work unit engineer, Sunnyside, Wash., and area engineer, Yakima, Wash., all of the Soil Conservation Service.

Typical Yakima area soils and selected local filter materials.

drawn and printed. Similar forms on the same scale were made for local filter materials, but printed on acetate overlays. This provided an opportunity to use an overlay system so that any soil could be combined with any filter material. All forms were placed in a looseleaf folder so that additions could be made as more tests and coverage were given the area.

A sidelight to the system was devised for the use of bottled samples of both the soils and filter materials. These give a more graphic comparison than the curves drawn on the analysis sheets and serve better in working with farmers and contractors, since the bottled samples can be used in the field or pit to make a visual comparison.

With the charts and samples, SCS engineers went to the field to test the field application of their studies. Here they received a surprise. As they showed the results of their tests to contractors and farmers, they found them more than anxious to use the system. The results to date on the use of this proper filter material have been most satisfactory and gratifying. In the past season alone several miles of tile were laid using tested filter materials.

The acid test of the results will be measured over a long period as we are able to encourage more efficient and enduring drainage facilities. Research indicates we are on the right track.

The initial publication of this material, *Handbook and Guide for Drainage Tile Filters,* by Oliver D. Jeffords, is now in the field. This is a part of the drainage guide for Benton, Kittitas, Klickitat, and Yakima Counties, Wash.

In *Highway* magazine for July 1957, an article entitled "Clogging Hazards in Subdrains," by J. M. Robertson, states: "While it is theoretically advisable to test the soils and specify filters for particular soils encountered along the proposed drain, it is to a certain extent impractical and will not usually be done. Therefore, if possible, it is more practical to select a filter gradation which will perform satisfactorily for all soils or nearly all soils. If necessary, the specification can be varied for certain districts or even for certain types of soils." Mr. Robertson has recently requested and received a copy of our guide. We hope it will aid in solving the problem he outlines.

With the widespread adoption of drainage filter guides in soil conservation districts across

the country, the Soil Conservation Service has a real opportunity and a challenge to be of service to the construction industry, highway departments, and others who are faced with drainage problems. As the Service is charged with the responsibility of surveying and coordinating soils throughout the United States, it is only natural that it should take the lead in getting information on drain filters and related soil series. We feel we have made a good start.

Stable Land For Research

A Complete Soil and Water Conservation Program is Installed on a Mountainous Experiment Station.

By ROY R. BECK

CONTRASTING land conditions make the North Carolina Mountain Research Station, just east of Waynesville, an interesting and extremely useful farm. Varied conditions of mountainous slopes, rolling hills, and level bottom lands require many different conservation measures to control erosion and keep the land productive. Here, research workers are gleaning information on better ways and means of farming in western North Carolina.

This research station is owned and operated by the North Carolina Department of Agriculture for the use of cooperating research agencies. Field studies of agricultural problems encountered in the foothills and mountains of the State are carried out by the State Experiment Station, USDA Agricultural Research Service, and TVA. Experiments last from 30 days to many years.

When the farm was purchased in 1944, it consisted of several typical rundown mountain farms having steep, cutover woodlands, eroded hillsides, and wet bottom lands along Raccoon Creek, an unruly stream that flows through the middle of the farm.

Getting the farm into productiveness to support a dairy herd was the first order of business. Barns, silos, and tobacco-curing barns, for research on Burley tobacco production, were constructed. All fences were rebuilt and existing pastures renovated by using plenty of lime and fertilizer before reseeding to more productive legumes and grasses.

M. R. Whisenhunt inspecting Raccoon Creek after channel improvement and stabilization.

By October 1950, when M. R. Whisenhunt was appointed superintendent, the farm was a going concern with work on tobacco, alfalfa, and a small grain test-plot underway, and an ever-growing dairy herd to be fed from the land.

Whisenhunt soon began adding erosion-control measures. He continued planting white pine seedlings on land too steep for pasture and fenced the woods to prevent grazing. Alfalfa for hay and later for silage was seeded on the lesser slopes over which tractor-drawn equipment could be operated efficiently.

Roadbank stabilized with vegetation on the N. C. Mountain Research Station.

Note:—The author is work unit conservationist, Soil Conservation Service, Waynesville, N. C.

Stripcropping on the N. C. Mountain Research Station.

As the steep land was planted back to trees, more moderate wooded slopes were cleared for additional pastures and the new experimental orchard. Limited funds were a constant problem, but by careful planning the conservation work was carried forward step by step. The need for roughage production forced station personnel to crop bottom land fields along Raccoon Creek. This proved to be unsatisfactory, because the crooked, silted-in stream flooded the fields after every hard rain.

Damage to crops was so great that the station called on the Haywood County Soil Conservation District supervisors for technical help in controlling this stream. Soil Conservation Service technicians assigned to the district not only designed and supervised excavation of a straight, enlarged channel, but helped develop a complete conservation program for the entire farm.

Strange as it may seem, it was on this same Raccoon Creek that Harley Ferguson, as a boy, experimented with jetties and levees; structures he used in later years to tame the Mississippi River when he was Brigadier General with the Army Corps of Engineers.

The conservation program at the North Carolina Mountain Research Station has moved along rapidly the last 2 years. An elaborate terra cotta, tile drainage system has been installed in one 12 acre bottom land field, where corn and other row crops can now be grown, safe from flooding.

Contour stripcropping, laid out in even-width rows that are easily farmed with tractors, protect the largest hillside crop field. On this same field, where rainwater gathers in natural drain-

White pine planting on sloping hillside of mountain research station.

age courses, fescue grass waterways are being seeded to carry surplus water safely down the slope.

Pine and hardwood trees growing on the steepest land are getting their share of conservation treatment. Protected from fire and grazing, these woodlands are to be managed for sawlog production.

From steep mountainous slopes to level bottom land fields, wise land use, along with a wide variety of conservation measures, protect the land and help scientists find better farming methods for western North Carolina.

THE FEDERAL LANDS: Their Use And Management. By Marion Clawson and Burnell Held. 501 pp. Illustrated. 1957. Baltimore: The John Hopkins Press. $8.50.

THIS book is a highly authenticated volume on the use and management of U. S. Federal lands. Both authors are on the staff of Resources for the Future, Inc., where Dr. Clawson is in charge of the foundation's program of land use and management. This is the most complete treatise ever published on the subject of Federal lands.

Uncle Sam is the largest landowner in America. Nearly one-fifth of the Nation's land is federally owned. Federal lands include national forests, grazing districts, national parks and monuments, wildlife refuges, land utilization projects, submerged areas of the outer continental shelf, and others. The authors reveal how these acreages are used and managed and give illuminating facts on costs and returns.

Many of these lands are "tail end" areas that under private ownership, will not be tax assessed. Some are valuable oil, gas, timber, mineral, and grazing lands; other areas are important for recreational purposes. In the West, the most productive watershed lands are federally owned. Their economic importance increases yearly and methods of managing them need some revision.

The authors consider these changes, indicate what brought them on and examine various methods for improvement. They point out that improvements need to be made and recommend a full-scale reexamination of Federal land management.

Federal land has been a subject of controversy ever since the federation of the original Thirteen Colonies. Clawson and Held have dived into the middle of this lively controversy by first recognizing that a valid problem exists, and second, by suggesting provocative remedies.

One suggestion is to form a Federal land corporation to manage all Federal lands. The corporation might resemble patterns already in use by the Federal land bank, the intermediate credit bank, or the production credit association. Other options for managing Federal lands also are considered.

The authors argue mainly for a critical examination of present Federal land-management processes in order to perfect a better system. They attempt no impregnable defense of their own ideas on the subject. In fact, they have made a clean-cut critique of the government corporation method of land management and point out obvious soft spots in the system.

Regardless of a reader's personal ideas about Federal land management he will find this a provocative book, which should stimulate a lot of productive thinking.

—B. W. ALLRED